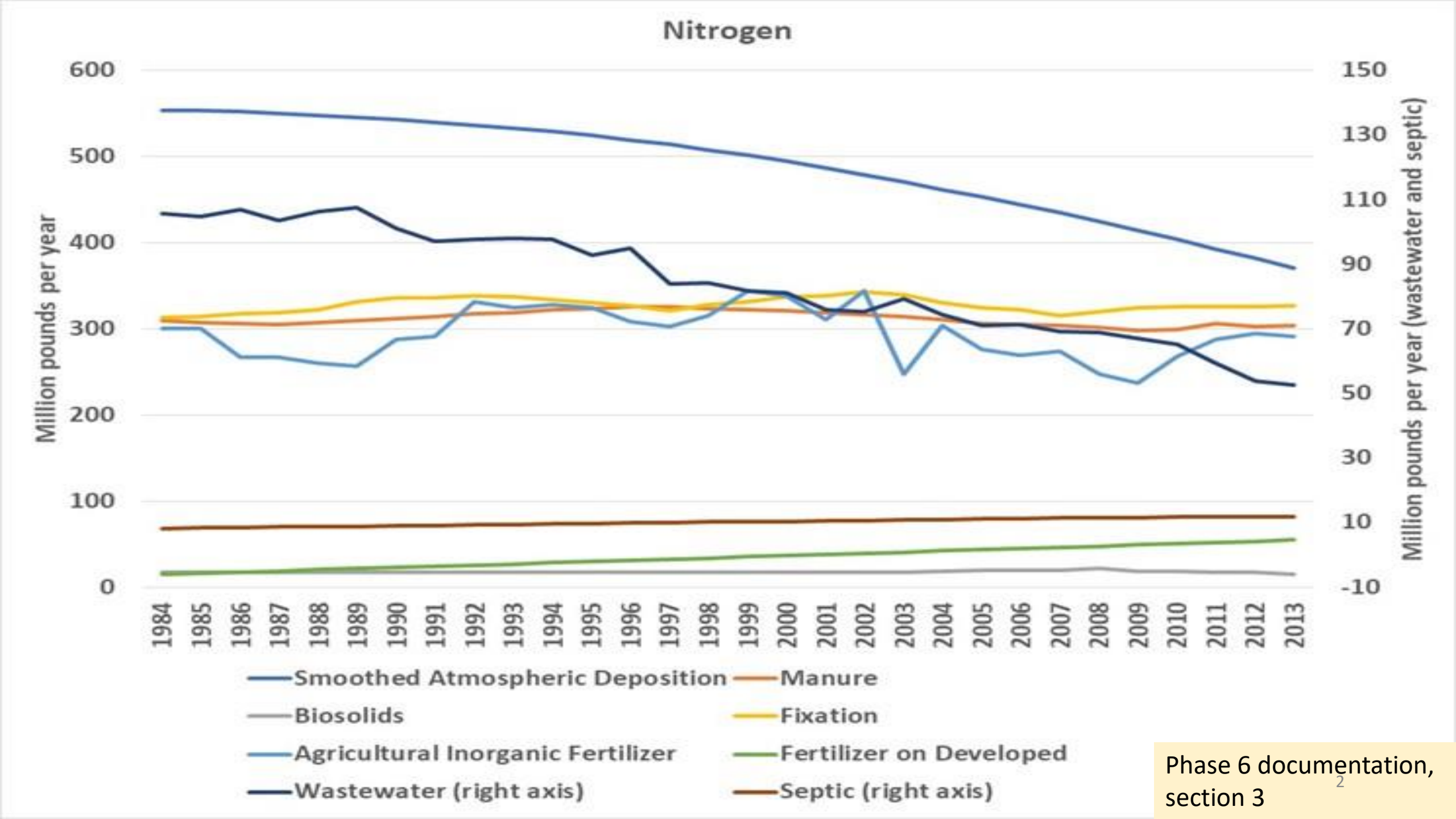
Atmospheric Deposition Updates

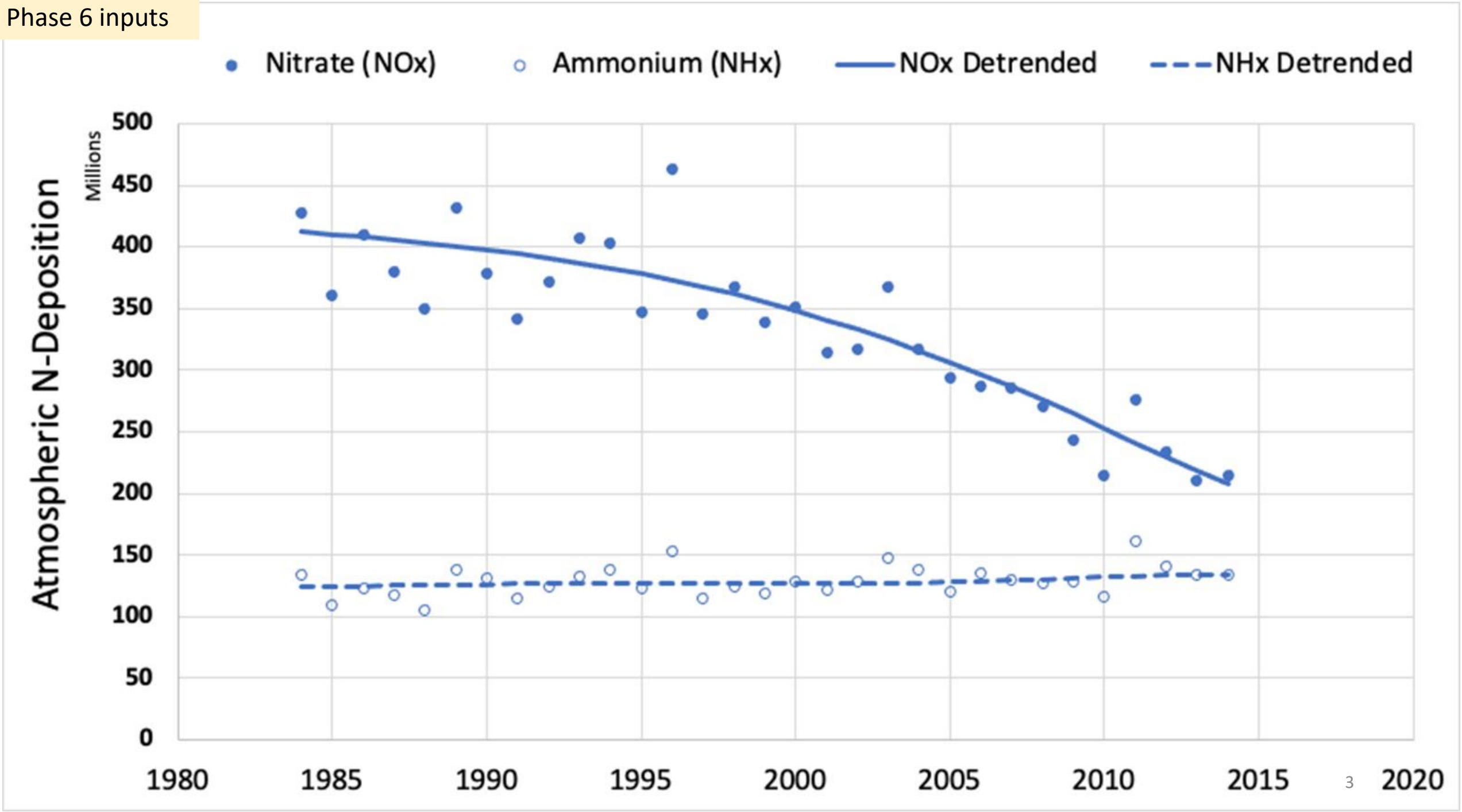
8/3/2023

WTWG



Phase 6 documentation, section 3

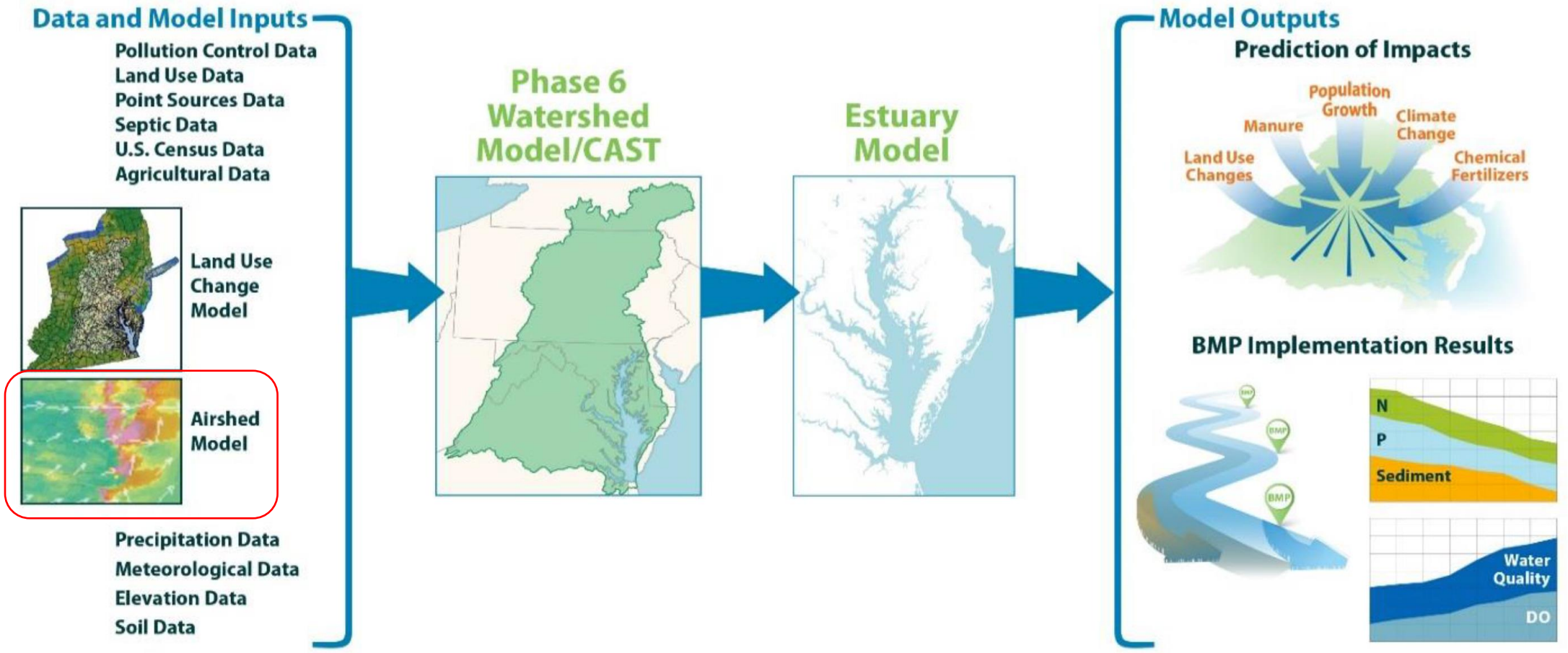
Phase 6 inputs



Questions

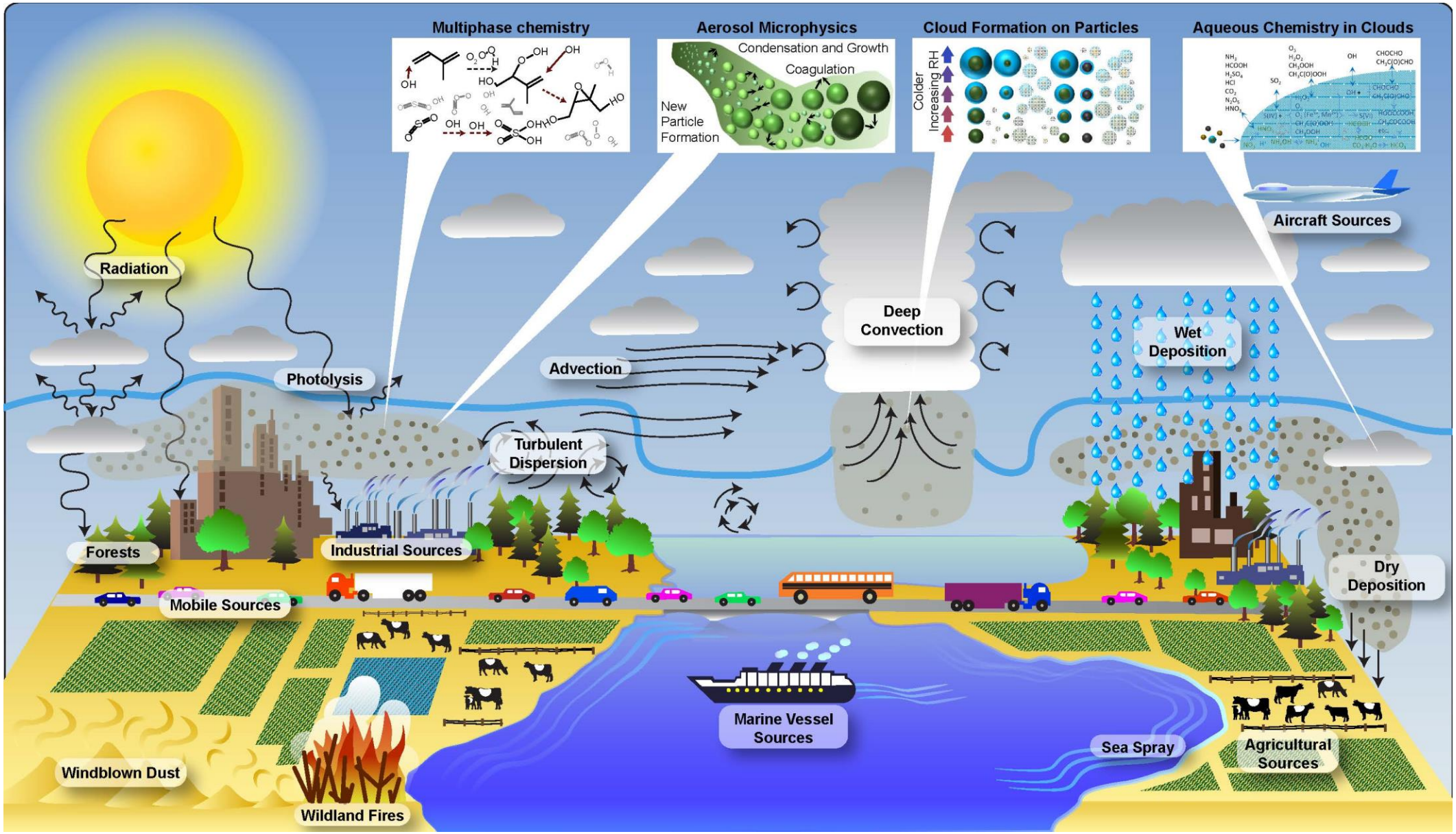
- How do different emission sources and regions deposit around the watershed?
- What is the proportion of load from atmospheric deposition?
- What is the effect of emission reductions?

Chesapeake Bay Program Modeling System



Hood et al. 2021 https://doi.org/10.1016/j.ecolmodel.2021.109635

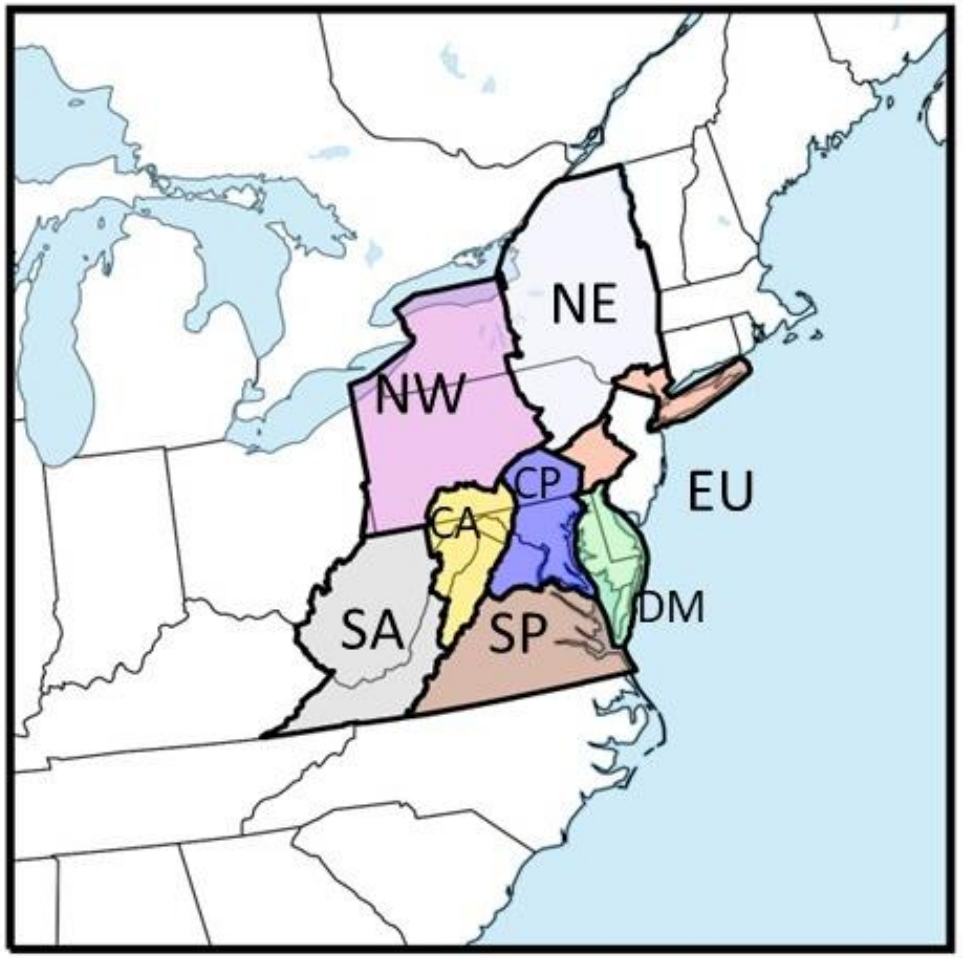
CMAQ



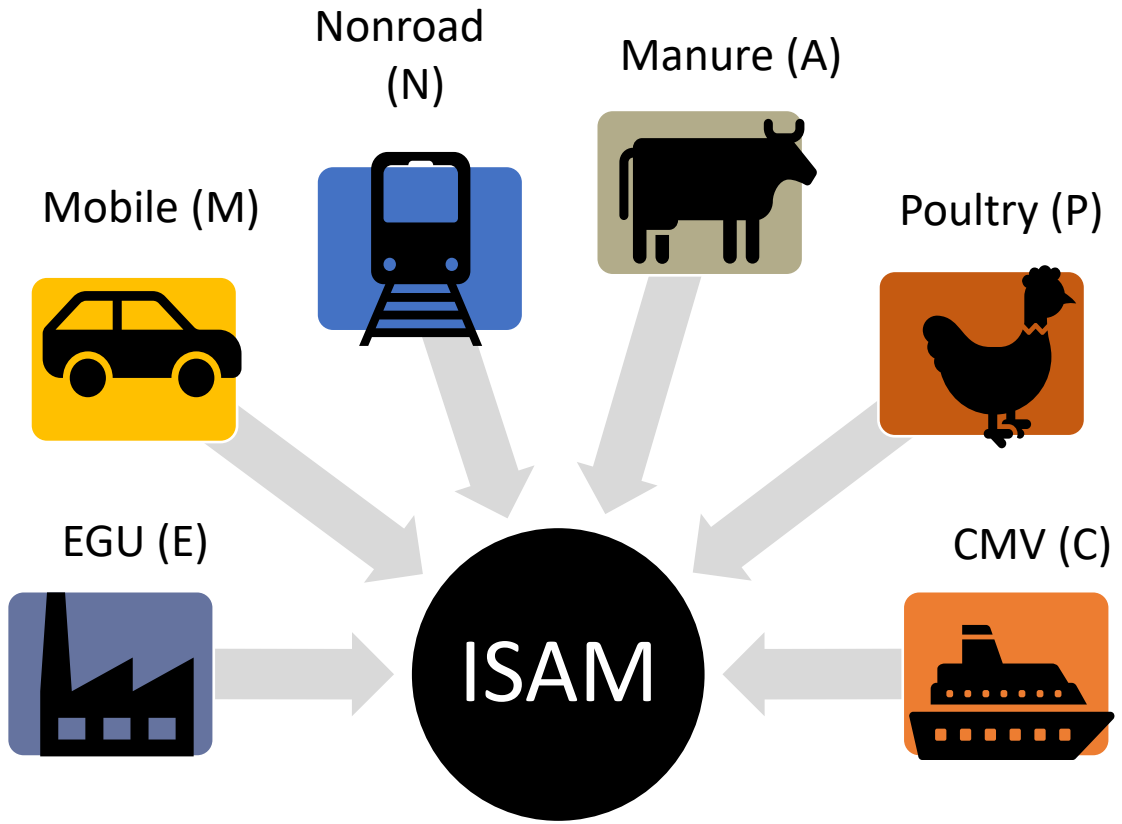
https://www.epa.gov/cmaq/overview-science-processes-cmaq

CMAQ Integrated Source Apportionment Method (ISAM)

Geographic emission source regions



A subset of Emission source categories

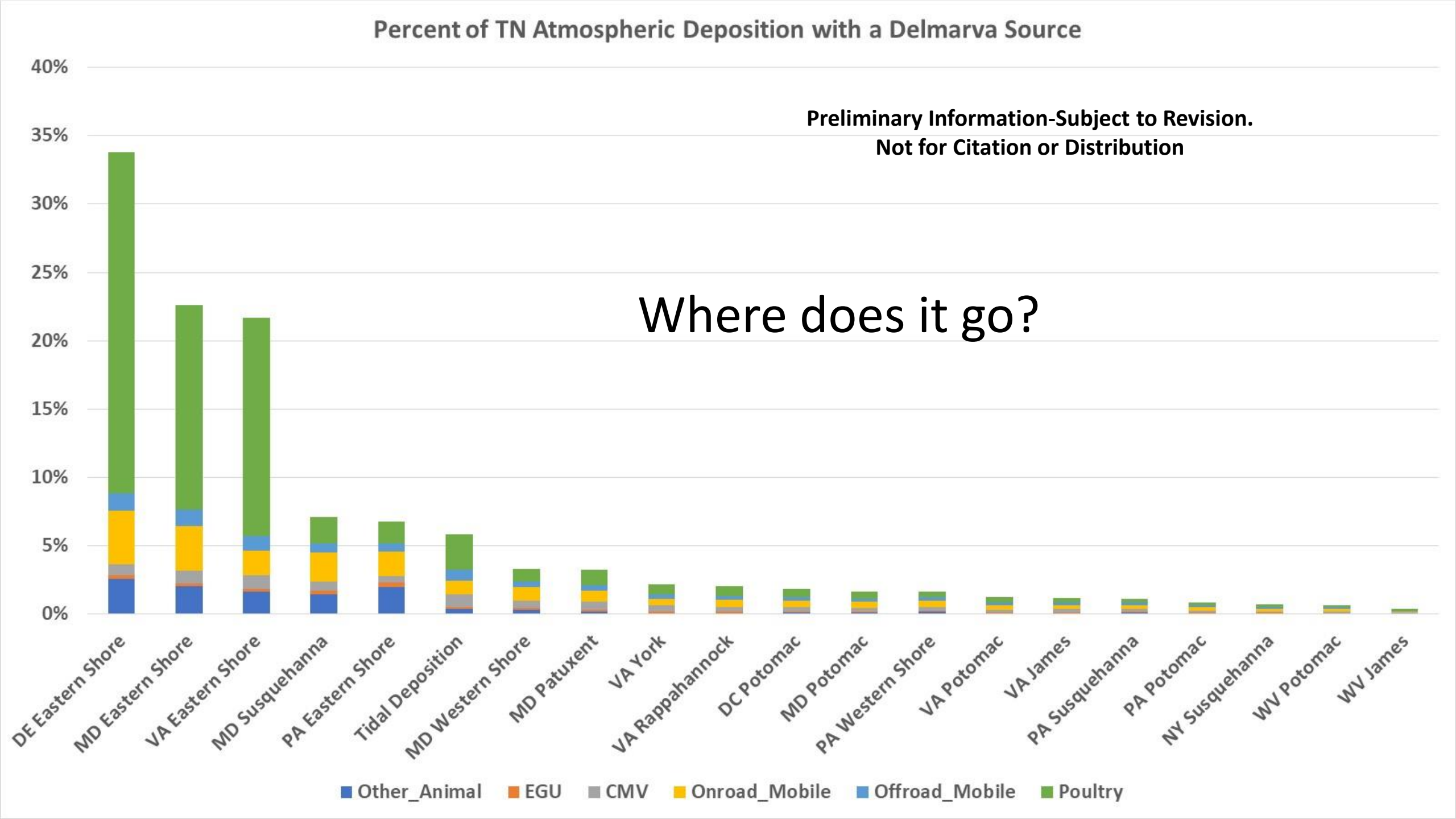


Benish et al., 2023 *in review*

Where does it come from?

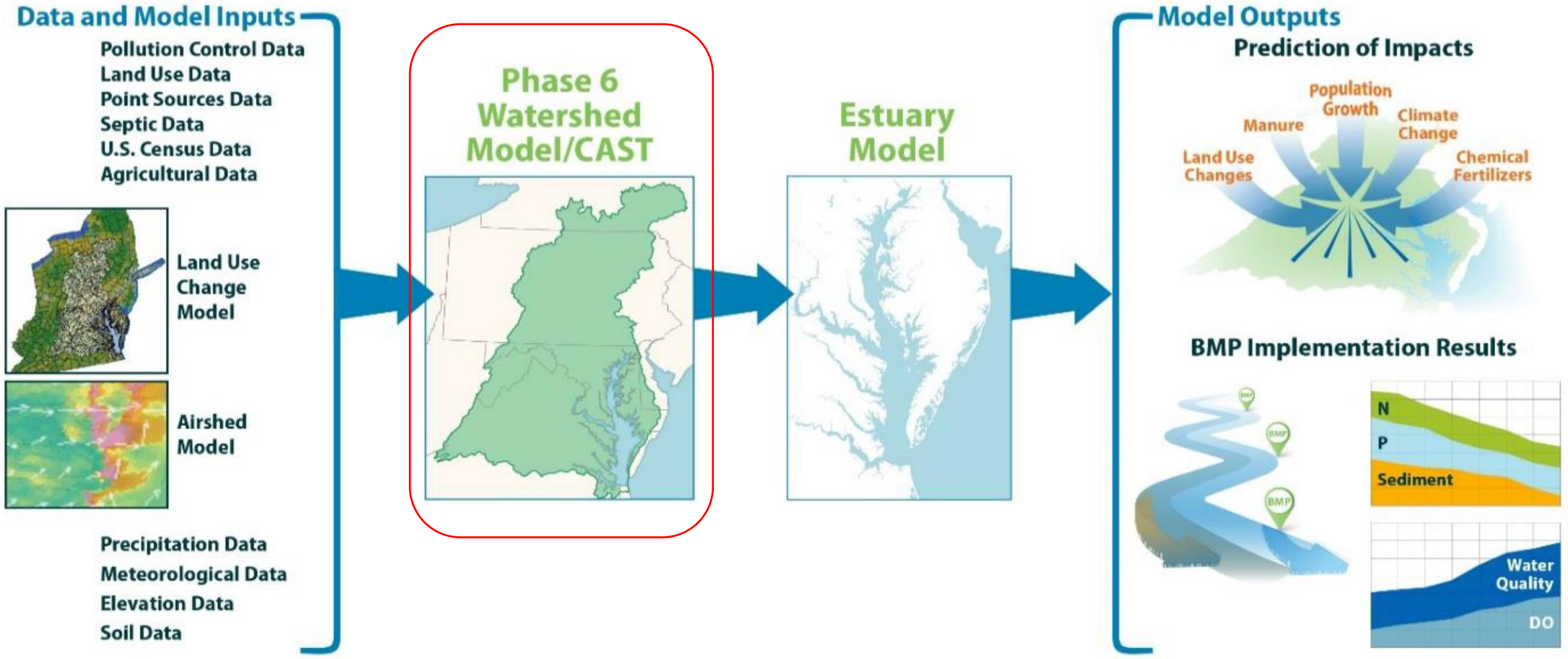
Source Apportionment of Atmospheric deposition of ammonia to the Delmarva

Benish et al., 2023 *in review*

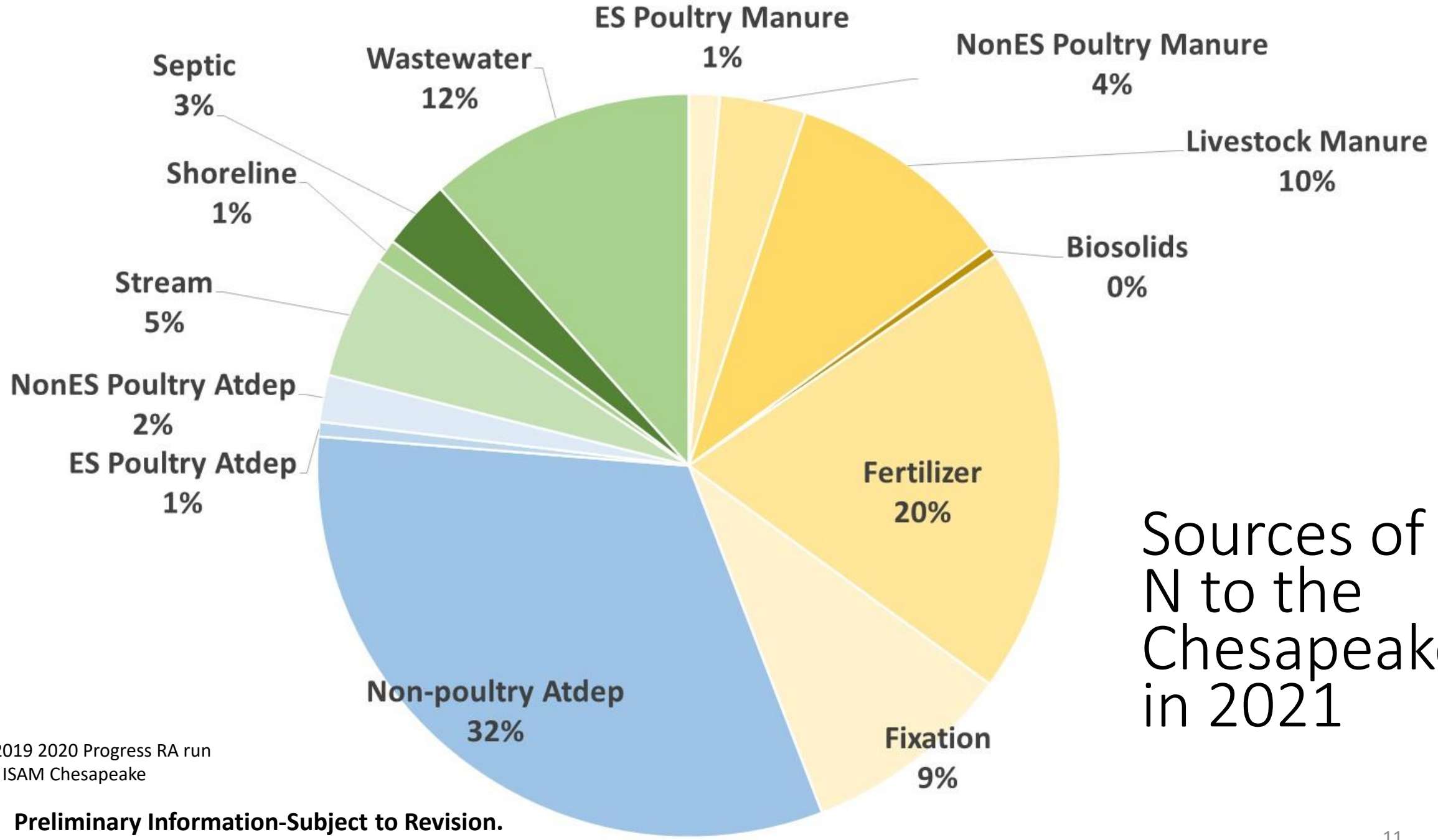

Percent of TN Atmospheric Deposition with a Delmarva Source
Preliminary Information-Subject to Revision.
Not for Citation or Distribution
Where does it go?
40%
35%
30%
25%
20%
15%
10%
5%
0%
DE Eastern Shore
MD Eastern Shore
VA Eastern Shore
MD Susquehanna
PA Eastern Shore
Tidal Deposition
MD Western Shore
MD Patuxent
VA York
VA Rappahannock
DC Potomac
MD Potomac
PA Western Shore
VA Potomac
VA James
PA Susquehanna
PA Potomac
NY Susquehanna
WV Potomac
WV James
Other_Animal
EGU
CMV
Onroad_Mobile
Offroad_Mobile
Poultry

How does it compare to other loads

Chesapeake Bay Program Modeling System



Hood et al. 2021 https://doi.org/10.1016/j.ecolmodel.2021.109635



Sources of N to the Chesapeake in 2021

CAST-2019 2020 Progress RA run
CMAQ ISAM Chesapeake

Preliminary Information-Subject to Revision.
Not for Citation or Distribution

Atmospheric path is not efficient

Reduced nitrogen: Ammonia

	Emitter DE	Emitter MD	Emitter NY	Emitter PA	Emitter VA	Emitter WV
To Watershed	24.0%	49.6%	13.7%	34.1%	41.8%	25.7%
Delivered	3.2%	6.8%	1.8%	5.1%	4.6%	3.2%
To Bay	2.0%	4.4%	0.6%	1.6%	4.4%	1.7%
Total Delivered	5.3%	11.2%	2.4%	6.7%	8.9%	5.0%

**These are currently in use but can change with the new ISAM model runs.

Source: Phase 6 documentation

Summary

- Atmospheric deposition is a large, but decreasing, source of nitrogen to the Bay watershed.
- New model runs allow us to identify source-receptor relationships between regions for different types of emission sources
- Transport between emission and tidal waters is not efficient
  - Coefficients can be updated for future models